

REMARKS

Claim 11 has been amended. Claim 19 has been added.

In the Office Action under reply, claims 11-14 have been rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. Claims 11-13 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Ito et al. ("Ito") (JP 2003-139298) in view of Kanazawa (JP 59-197546) and Fujitani et al. ("Fujitani") (U.S. Patent 5,728,483). Claim 14 has been rejected under 35 U.S.C. 103(a) as being unpatentable over Ito, Kanazawa, Fujitani in further view of Dickman et al. ("Dickman") (U.S. Publication No. 2001/0049038). With respect to Applicant's claims, as amended, these rejections are respectfully traversed.

Applicant's independent claim 11 has been amended to better define Applicant's invention. More particularly, amended claim 11 recites an electronic device capable of detecting a residual capacity of a fuel cell device, the fuel cell device including a tank section for accommodating a first hydrogen storage alloy having a first hydrogen desorbing characteristic and a second hydrogen storage alloy having a second hydrogen desorbing characteristic which is different from the first hydrogen desorbing characteristic, and a power generating section for generating electric power by using hydrogen desorbed from the tank section, comprising: a pressure detecting unit for detecting a pressure of the hydrogen supplied to the power generating section; a comparing unit for comparing (i) the pressure of the hydrogen detected by the pressure detecting unit with a pressure of a first pressure equilibrium state of the first hydrogen desorbing characteristic and comparing (ii) the pressure of the hydrogen detected by the pressure detecting unit with a pressure of a second pressure

equilibrium state of the second hydrogen desorbing characteristic; (page 20, line 10 - page 22, line 25; S107 and S109) a residual amount detecting unit for detecting a residual hydrogen amount based on comparison results of the comparing unit (page 20, line 10 - page 22, line 25; S108 and S110); and a control unit which operates with the electric power supplied from the power generating section. Support for the amendments to claim 11 are set forth in the application as originally filed in the pages identified in parentheses above. As discussed below, such a construction is not taught or suggested by the cited art of record.

New claim 19 is presented. Support for the features recited in new claim 19 is presented in the application as originally filed on page 20, line 10 - page 22, line 25 (S111).

With regard to the rejection of the claims under 35 U.S.C. 112, first paragraph, applicant's claim 11 has been amended to clarify that a pressure detecting unit detects the pressure of the hydrogen supplied to the power generating section and a comparing unit compares (i) the pressure of the hydrogen detected by the pressure detecting unit with a pressure of a first pressure equilibrium state of the first hydrogen desorbing characteristic and compares (ii) the pressure of the hydrogen detected by the pressure detecting unit with a pressure of a second pressure equilibrium state of the second hydrogen desorbing characteristic. This is based on the discussion in the application as originally filed from page 20, line 10 to page 22, line 25. Accordingly, claim 11 satisfies the requirements of 35 U.S.C. 112, first paragraph.

With regard to the rejection of the claims in view of the cited prior art, the present invention as recited in applicant's claim 11 is characterized by the following features:

- (1) a tank section accommodates a first hydrogen storage alloy having a first hydrogen desorbing characteristic and a second hydrogen storage alloy having a

second hydrogen desorbing characteristic which is different from the first hydrogen desorbing characteristic;

(2) comparing (i) the pressure of the hydrogen detected by the pressure detecting unit with a pressure of a first pressure equilibrium state of the first hydrogen desorbing characteristic and comparing (ii) the pressure of the hydrogen detected by the pressure detecting unit with a pressure of a second pressure equilibrium state of the second hydrogen desorbing characteristic; and

(3) detecting a residual hydrogen amount based on the comparison results.

These features are neither disclosed nor suggested in the cited prior art.

Ito discloses filling hydrogen storage alloy MH in a storage tank 3 and another kind of hydrogen storage alloy MH1 in a tank 4 that is used to detect a remaining amount of hydrogen. As disclosed in Ito, since alloy MH1 has larger pressure changes for a hydrogen storage amount, particularly in the Plateau region of a pressure-composition-temperature curve, than that of alloy MH, the remaining amount of hydrogen can be estimated by monitoring a pressure sensor 20 that detects the pressure of tank 4, provided that the flow rate ratios of hydrogen gases from the respective tanks are controlled to be the same as that of the amounts of the alloys filled in the tanks.

As discussed in Applicant's response dated April 7, 2010, Ito detects a residual amount of hydrogen only based on the pressure of the tank for detecting the residual amount 4, namely, the pressure of a single alloy MH1. Accordingly, Ito neither discloses nor suggests the characteristic features (1), (2) and (3) discussed above of Applicant's invention as recited in amended claim 11.

Kanazawa discloses a hydrogen storage method that entails using a mixture of hydrogen storage alloys so that the relationship between the storage amount of the hydrogen storage alloys and an equilibrium pressure remains linear. In particular, Kanazawa discloses adjusting a

mixture ratio of the different metal hydrides so as to achieve a linear relationship between the storage amount of the hydrogen storage alloys (H/M) and their equilibrium pressure.

Accordingly, since Kanazawa describes to use a mixture of hydrogen storage alloys so that the relationship between the storage amount of the hydrogen storage alloys and an equilibrium pressure is to be linear, the mixture of hydrogen storage alloys in Kanazawa in no way represents any pressure equilibrium state, such as the first and second pressure equilibrium states 451 and 453 shown in Fig. 6 of the present invention. Hence, Kanazawa is based on a completely different concept of that of the present invention, wherein the present invention utilizes the pressure equilibrium states for detecting the residual hydrogen amount. Therefore, Kanazawa neither discloses nor suggests the characteristic features (1), (2) and (3) discussed above of Applicant's invention as recited in amended claim 11.

Fujitani discloses accommodating hydrogen absorbing alloys 4 having an equilibrium hydrogen pressure in an alloy container 3. Fujitani alone also neither discloses nor suggests the characteristic features (1), (2) and (3) of the present invention discussed above.

In the Office Action, the Examiner has acknowledged that neither Ito nor Kanazawa specifically discloses "wherein the pressure detecting unit is able to detect the first pressure equilibrium state or the second pressure equilibrium state that is caused on the basis of the first and second hydrogen desorbing characteristics" as previously recited in claim 11. (Office Action, page 5, lines 2-4) Hence, the combination of Ito and Kanazawa neither discloses nor suggests the characteristic features (1), (2) and (3) of Applicant's amended claim 11. However, the Examiner further has asserted that "it would have been obvious to one of ordinary skill in the art to modify the system operation of Ito et al. and Kanazawa by measuring the

equilibrium hydrogen pressures of the hydrogen storage alloys because Fujitani et al. teaches that the equilibrium hydrogen pressure is an important characteristic for determining the hydrogen absorption, storage (residual amount) and desorption pressure relating to safety and reliability.” (Office Action, page 5, lines 8-13). Applicant respectfully disagrees with such an assertion by the Examiner.

Ito, as discussed above, relies on the pressure of a single alloy and Kanazawa is directed to the use of a mixture of hydrogen storage alloys that clearly do not represent any pressure equilibrium state. Accordingly, in light of the teachings of Ito and Kanazawa, there is neither disclosure nor motivation to utilize the pressure equilibrium states caused by different hydrogen desorbing characteristics of different alloys in order to detect the residual hydrogen amount. Fujitani likewise doesn’t teach this feature. While Fujitani may disclose that certain characteristics are important, such disclosure is clearly insufficient to make obvious the specific invention as recited in Applicant’s claim 11. Namely, the cited art neither discloses nor suggests, individually or in combination, the characteristic features of Applicant’s claim 11 as discussed above. Accordingly, the proposed combination of Ito, Kanazawa and Fujitani would not result in:

(1) a tank section that accommodates a first hydrogen storage alloy having a first hydrogen desorbing characteristic and a second hydrogen storage alloy having a second hydrogen desorbing characteristic which is different from the first hydrogen desorbing characteristic;

(2) comparing (i) the pressure of the hydrogen detected by the pressure detecting unit with a pressure of a first pressure equilibrium state of the first hydrogen desorbing characteristic and comparing (ii) the pressure of the hydrogen detected by the pressure detecting unit with a pressure of a second pressure equilibrium state of the second hydrogen desorbing characteristic; and

(3) detecting a residual hydrogen amount based on the comparison results.

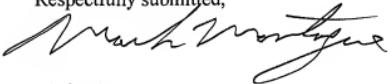
Therefore, neither Ito nor Kanazawa nor Fujitani discloses the above-described features of Applicant's independent claim 11. Hence, Applicant's amended claim 11 and the dependent claims thus patentably distinguish over Ito, Kanazawa and Fujitani. In addition, Dickman, which was cited against dependent claim 14, adds nothing to change this conclusion.

In view of the above, it is submitted that Applicant's claims, as amended and newly presented, patentably distinguish over the cited art of record. Accordingly, reconsideration and allowance of the application and claims is respectfully requested.

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Respectfully submitted,



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